

微光技术

低噪声、高增益微通道板的研制

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摘要 降低微通道板噪声和增加其电子增益是改善微光像增强器信噪比、视场清晰度和亮度增益最好的技术途经之一。采用具有高而且稳定的二次电子发射系数的皮料玻璃和与皮料玻璃的热物理性能相匹配且化学腐蚀速率比皮料大4个数量级的芯料玻璃以及与两者在一切工艺过程相匹配的实体边玻璃, 通过优化实体边实芯工艺制作出的高性能微通道板, 其暗电流密度小于 $5 \times 10^{-13} \text{A/cm}^2$, 固定图案噪声和闪烁噪声明显降低; 在真空系统中, 经 $40 \mu\text{A}$ 电子清刷后, 电子增益(800V)大于500。制管实验表明: 这种微通道板达到了预期效果。

关键词 [微通道板](#) [噪声](#) [暗电流密度](#) [电子增益](#) [视场清晰度](#)

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Development of low noise, high gain microchannel plate

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Abstract To reduce the noise and increase the electron gain of microchannel plate (MCP) is one of the best solutions to improve the signal to noise ratio, FOV definition and brightness gain for image intensifiers. The high performance MCP was fabricated by adopting the clad glass which has high and stable secondary emission coefficient, the core glass which matches the thermal physical property of the clad glass, but its etch rate is 4 orders greater than that of clad glass, and the border glass which matches the clad glass and core glass in the whole manufacture process. The MCP fabricated with this optimized technique shows better performance, its dark current density is less than $5 \times 10^{-13} \text{A/cm}^2$, its fixed pattern noise and scintillating noise are significantly reduced. After it is scrubbed by electrons of $40 \mu\text{A}$, its electron gain (800V) is greater than 500 in vacuum system. The experiment results indicate it meets the expectation.

Key words [microchannel plate](#) [noise](#) [dark current density](#) [electron gain](#) [FOV definition](#)

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